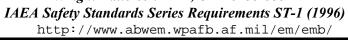
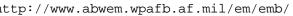


WPAFB RADIATION SAFETY OFFICE

88 ABW/EMO

Wright-Patterson AFB, OH 45433-5332





| Date: | | Shipper: | Destination | on: | | | | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|----------------------------|-----------------------------------------------|----------------------|--|--|--|--|--|
| Item | Description | Radionuclide | Activity Each | Number of Items | Total Activity | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| Radiation Package Survey Results: surfacemrem/hr 1 metermrem/hr | | | | | | | | | | |
| Instrume | ent Used: Mfgr: | Model: | S/N: | Cal 1 | Date: | | | | | |
| Person Completing Checklist: Signature: | | | | | | | | | | |
| PACKAGES and PACKAGING (General Requirements (§606-616)) | | | | | | | | | | |
| 2 3 3 4 5 5 6 7 7 8 9 9 9 | Designed in relation to its mass, volume and shape that it can be easily and safely handled and transported. Designed so it can be properly secured in or on the conveyance during transport. Design such than any lifting attachments on the package will not fail. Packaging is such that the external surfaces are free from protruding features and can be easily decontaminated. The outer layer of the package is so designed as to prevent the collection and retention of water. Package capable of withstanding the effects encountered in transport. Securing devices are designed to prevent them from becoming loose or being released unintentionally. The smallest overall external dimension is not less than 10 cm (4 in). (§634) The outside shall incorporate a security seal. (§635) The non-fixed radioactive contamination on any external surface of the package shall not exceed 0.4 Bq/cm2 (10⁻⁵ μCi) betagamma and 0.04 Bq/cm² (10⁻⁶ μCi/cm²) alpha. (§508). CONTENT LIMITS FOR TYPE A PACKAGES | | | | | | | | | |
| \square 1. Type A Package contains radioactive material(s) less than or equal to A_1/A_2 activity limits. (§413) | | | | | | | | | | |
| 2. | A ₁ /A ₂ Activity L | imit:TBq (| _mCi) Act | tual A ₁ /A ₂ Activity: | _TBq (mCi) | | | | | |
| If more than one radionuclide is being shipped in one package an unity calculation shall be performed. Note: Selected radionuclide A_1/A_2 values are listed on the back. A complete listing can be found in Section IV, Table I | | | | | | | | | | |
| LABELING REQUIREMENTS FOR TYPE A PACKAGES | | | | | | | | | | |
| YES NO 1. Survey performed to determine proper label. (§533, Table VII) - Category I-White − Surface: ≤ 0.005 mSv/hr (0.5 mrem/hr) / T.I. None Required - Category II-Yellow − Surface: > 0.005 ; ≤ 0.5 mSv/hr (> 0.5 mrem/hr ; ≤ 50 mrem/hr) / T.I. ≥ 0 ; ≤ 1.0 - Category III-Yellow − Surface: > 0.5 ; ≤ 2.0 mSv/hr (> 50.0 mrem/hr ; ≤ 200 mrem/hr) / T.I. ≥ 1 ; ≤ 10.0 3. Labels include Contents-Radionuclide(s); Activity-(Bq); T.I(Categories II-Yellow and III-Yellow ONLY). (§543) 2. Labels affixed to two opposite sides of the package. (§542) | | | | | | | | | | |
| MARKING REQUIREMENTS FOR TYPE A PACKAGES | | | | | | | | | | |
| ☐ ☐ 2. | Outside of packa A PACKAGE). (| ge marked with consignor, c ge marked with appropriate U §535) ge marked with gross mass, | JN# and Proper Shipping Na | • | CTIVE MATERIAL, TYPE | | | | | |

TRANSPORT DOCUMENT FOR TYPE A PACKAGES

| YES NO | | | | | | | |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|--|--|
| □ □ 1. | Proper shipping name (i.e. RADIOACTIVE MATERIAL, TYPE A PACKAGE). (§549(a)) | | | | | | |
| \square \square 2. | United Nations Class Number "7". (§549(b)) | | | | | | |
| \square \square 3. | United Nations Number – (i.e. UN2915). (§549(c)) | | | | | | |
| □ □ 4. | Name or symbol of radionuclide(s). (§549(d)) | | | | | | |
| \square \square 5. | Physical and chemical form of material. (§549(e)) | | | | | | |
| \Box \Box 6. | Maximum activity for each radionuclide expressed in units of (Bq) with an appropriate (SI) prefix. (§549(f)) | | | | | | |
| □ □ 7. | Category of package (I-White, II-Yellow, or III-Yellow). (§549(g)) | | | | | | |
| \square \square 8. | Transport Index (Categories II-Yellow and III-Yellow ONLY). (§549(h)) | | | | | | |
| □ □ 9. | Certification statement: "I hereby declare that the contents of this consignment are fully and accurately described | | | | | | |
| | above by proper shipping name and are classified, packed, marked and labeled, and are in all aspects in proper condition for transport by (insert mode of travel) according to the applicable international and national governmental regulations."(§550) | | | | | | |
| | The document is signed and dated. (§552) | | | | | | |
| | . Supplementary information for loading, stowage, carriage, handling and unloading provided to the carrier. (§555) | | | | | | |
| TRANSPORTING BY ROAD | | | | | | | |
| | Labeled package, PLACARDS REQUIRED on two external lateral walls and the external rear wall of vehicle. (§570(b)) Non Exclusive Use radiation levels exterior surface of the vehicle < 2 mSy/hr (< 200 mrem/hr) (8572(a)) | | | | | | |

TYPE A QUANTITIES FOR SELECTED RADIONUCLIDES

(IAEA Safety Standards Series No. ST-1, Section IV, Table I)

VEC NO

| Radionuclide | A ₁ (TBq) | A ₂ (TBq) | Exempt Exempt Concentation (Bq/gm) | Exempt Activity (Bq) |
|-------------------|----------------------|-------------------------|------------------------------------|----------------------------|
| ²⁴¹ Am | 10 | 0.001 | 1 | 10000 |
| ¹⁴ C | 40 | 3 | 10000 | 1E7 |
| ⁵⁷ Co | 10 | 10 | 100 | 1E6 |
| ⁶⁰ Co | 0.4 | 0.4 | 10 | 1E5 |
| ¹³⁷ Cs | 2 | 0.6 | 10 | 10000 |
| ³ H | 40 | 40 | 1E6 | 1E9 |
| ¹²⁵ I | 20 | 3 | 1000 | 1E6 |
| ⁸⁵ Kr | 10 | 10 | 1E5 | 10000 |
| ⁶³ Ni | 40 | 30 | 1E5 | 1E8 |
| ²¹⁰ Po | 40 | 0.02 | 10 | 10000 |
| ²³⁹ Pu | 10 | 0.001 | 1 | 10000 |
| ²²⁶ Ra | 0.2 | 0.003 | 10 | 10000 |
| ¹⁸⁷ Re | Unlimited | Unlimited | 10000 | 1E7 |
| ⁹⁰ Sr | 0.3 | 0.3 | 100 | 10000 |
| ²³² Th | Unlimited | Unlimited | 10 | 10000 |
| Th (Nat) | Unlimited | Unlimited | 1 | 1000 |
| ²³⁸ U | Unlmited | Unlimited | 10 | 10000 |
| U (depleted) | Unlimited | Unlimited | 1 | 1000 |
| U (Nat) | Unlimited | Unlimited | 1 | 1000 |

DEFINITIONS

 A_1 – the activity value of special form radioactive material.

 $E_c = \text{Probe Efficiency (AP-100} = 0.3 \text{ for }^{239}\text{Pu; BP-100} = 0.45 \text{ for }^{90}\text{Sr})$

A = Area Swiped (300 cm²)

0.5 = 2 P to 4 P geometry conversion

cpm_(net) = Background subtracted from gross count

1 Bq = 1 dps or 60 dpm

 A_2 – the activity value of radioactive material, other than special form radioactive material.

CONSIGNEE – shall mean any person, organization or government which receives a consignment.

CONSIGNMENT – shall mean any package or packages, or load of radioactive material, presented by a consignor for transport.

CONSIGNOR – shall mean any person, organization or government which prepares a consignment for transport, and is named as consignor in the transport documents.

EXCLUSIVE USE – the sole use, by a single consignor, of a conveyance or of a large freight container, in respect of which all initial, intermediate and final loading and unloading is carried out in accordance with the directions of the consignor or consignee.

SPECIAL FORM RADIOACTIVE MATERIAL – shall mean either an indispersible solid radioactive material or a sealed capsule containing radioactive material.

TRANSPORT INDEX (T.I.) – assigned to a package, overpack or freight container or to unpackaged LSA-1 or SCO-I, shall mean a number which is used to provide control over radiation exposure. The T.I. is a dimensionless radiation measurement taken at one meter from the surface of a package and rounded to the nearest tenth.

Swipe Evaluation (ADM-300):

$$\frac{Bq}{cm^{2}} = \frac{cpm (net)}{0.5 \times E_{c} \times 60 \frac{\sec}{\min} \times A(cm^{2})}$$

 E_c = Probe Efficiency (AP-100 = 0.3 for ²³⁹Pu; BP-100 = 0.45 for ⁹⁰Sr)

A = Area Swiped (300 cm²)

0.5 = 2 P to 4 P geometry conversion

 $cpm_{(net)}$ = Background subtracted from gross count

1 Bq = 1 dps or 60 dpm

$$\frac{Bq}{cm^2} = \frac{100 \ cpm}{0.5 \times 0.3 \times 60 \frac{\sec}{\min} \times 300 \ cm^2} = \frac{100}{2700} = 0.037 \frac{Bq}{cm^2}$$

$$0.037 \frac{Bq}{cm^2} \times 60 \frac{dpm}{Bq} = 2.22 \frac{dpm}{cm^2}$$